

--popbio cheat sheet--

Examples:

The popbio package includes three example codes to demonstrate the capabilities of the package. You can access them by typing in the following:

```
demo("fillmore")
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demo("Caswell")
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demo("stage.classify")
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Matrix properties:

damping.ratio()	Calculates the damping ratio or speed of a projection matrix.
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fundamental.matrix()	Calculates the fundamental matrix of a projection matrix.
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generation.time()	Calculates the generation time of a stage-classified matrix.
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lambda()	Calculates the population growth rate of a projection matrix.
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net.reproductive.rate()	Calculates the net reproductive rate of a stage classified matrix using the dominant eigenvalue.
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reproductive.value()	Calculates the reproductive values of a projection matrix
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stable.stage()	Calculates the stable stage distribution of a projection matrix using the dominant eigenvalue.
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Perturbation analyses:

elasticity()	Calculate the elasticities of the population growth rate to changes in the projection matrix elements.
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LTRE()	Evaluates sensitivities in a fixed Life Table Response Experiment (LTRE).
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sensitivity()	Calculate the sensitivities of the population growth rate to changes in the projection matrix elements.
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vitalsens()	Calculates deterministic sensitivities and elasticities of lambda to lower-level vital rates using partial derivatives.
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Graphing:

image2()	Creates a grid of colored rectangles to display a projection, elasticity, sensitivity or other matrix.
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matplot2()	Plot the rows of a matrix. Useful for displaying a matrix of stage vectors, survival rates, sensitivities etc.
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stage.vector.plot()	Plots short-term dynamics and convergence to stage stage distribution using stage vector projections.
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Stochasticity:

<code>stoch.growth.rate()</code>	Calculates the log stochastic growth rate by Tuljapurkar's approximation and by simulation.
<code>stoch.projection()</code>	Simulates stochastic growth by projection using matrix selection techniques from a set of 2 or more projection matrices.
<code>stoch.quasi.ext()</code>	Estimate the quasi-extinction probability by simulation for a structured population in an an independently and identically distributed stochastic environment.
<code>stoch.sens()</code>	Calculates the sensitivity and elasticity of the stochastic growth rate to perturbations in the mean demographic projection matrix.

Other helpful functions:

<code>eigen.analysis()</code>	Calculate population growth rate and other matrix properties all at once.
<code>matrix2()</code>	Create a square matrix from a given set of values.
<code>mean.list()</code>	Calculates mean matrix from a list of matrices.
<code>pop.projection()</code>	Calculates the population growth rate and stable stage distribution by repeated projections of the equation $n(t+1)=An(t)$.

Additional resources:

Popbio manual:	https://cran.r-project.org/web/packages/popbio/popbio.pdf
Package description:	Stubben, C.S., Milligan, B. 2007. 'Estimating and analyzing demographic models using the popbio package in R'. Journal of Statistical Software 22:1-23.